

1971

OPERATING
SUMMARY

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GEORGETOWN

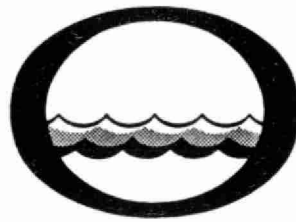
WATER POLLUTION CONTROL PLANT

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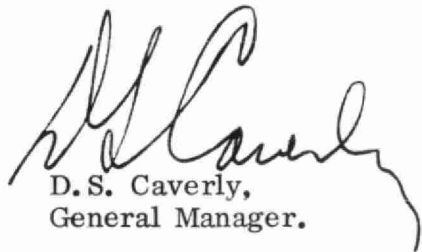


Water management in Ontario


Ontario
Water Resources
Commission

We are pleased to submit for your consideration a summary of operation during 1971 of the water pollution control plant serving your community.

This operating summary contains parameters normally used to measure plant performance and loading, as well as relevant cost data. Because of the concern over eutrophication of our lakes and of the requirement, in many parts of Ontario, to remove the major contributing factor, results of analysis for phosphorus appear in **this** summary.



D.S. Caverly,
General Manager.



D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.



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GEORGETOWN
WATER POLLUTION CONTROL PLANT

operated for

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by the

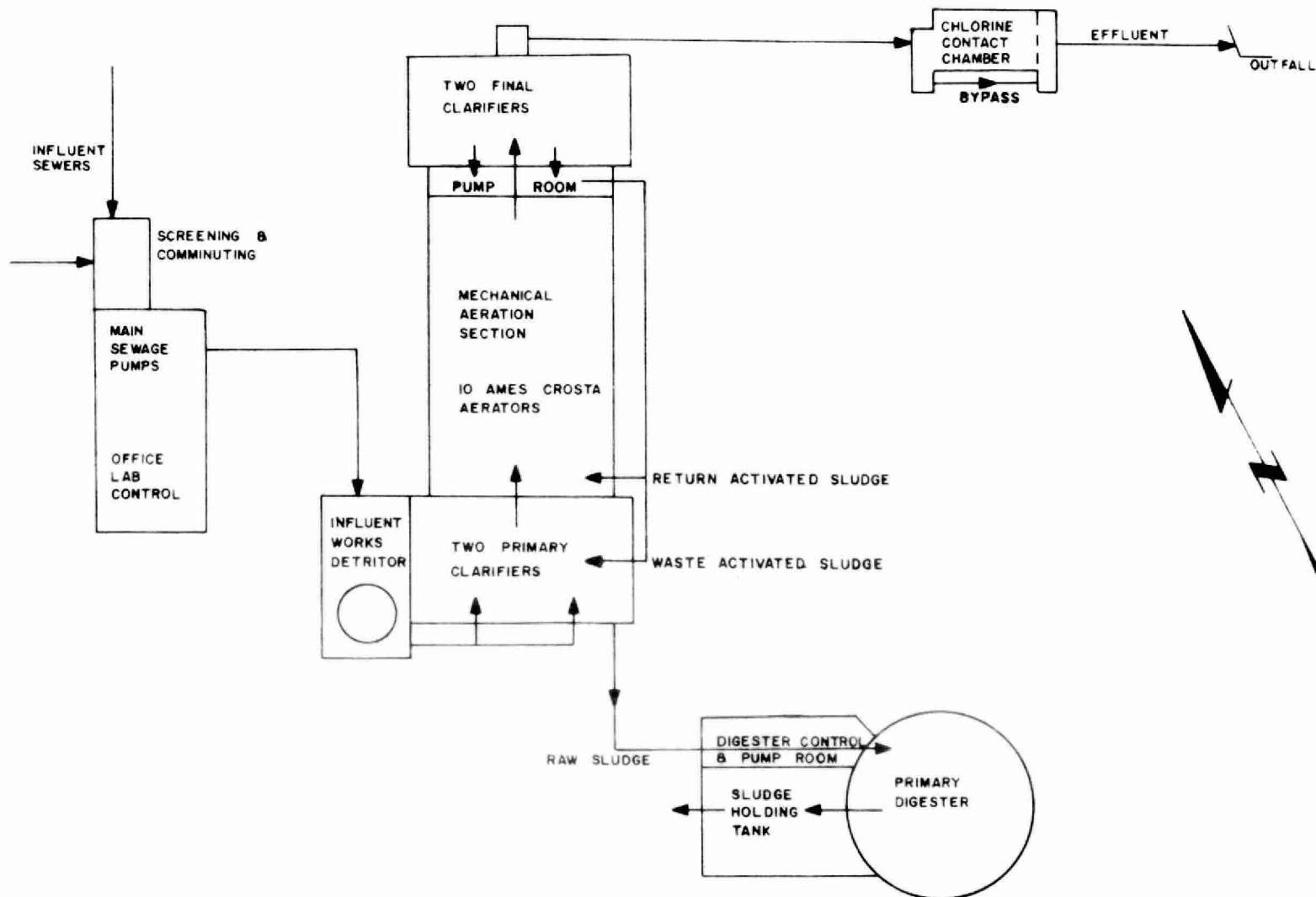
ONTARIO WATER RESOURCES COMMISSION

1971 ANNUAL OPERATING SUMMARY

CONTENTS

| | | |
|---------------|-----------|----|
| Title Page | | 1 |
| Flow Diagram | | 4 |
| Design Data | | 5 |
| '71 Review | | 6 |
| Project Costs | | 9 |
| Process Data | | 12 |

GEORGETOWN WPCP FLOW DIAGRAM



DESIGN DATA

PROJECT NO. 2-0017-58

TREATMENT Activated Sludge

DESIGN FLOW 1.50 mgd

DESIGN POPULATION 15,000

BOD - Raw Sewage 200 mg/l
- Removal 95%

SS - Raw Sewage 200 mg/l
- Removal 95%

PRIMARY TREATMENT

Screening

Type: Manually cleaned bar screen
Size: 3/4" spacing

Comminution

Type: C. P. Barminutor
Size: One Model C (24")

Sewage Lift Pumps

Type: Chicago Pump
Size: Two 2,900 gpm @ 60' tdh

Grit Removal

Type: Dorr Type WA Detritor
Size: One 12' x 12' x 1' 3" (1,120 gal)
Retention: 1.1 min

Primary Sedimentation

Type: Dorr Type A
Size: Two 35' x 35' x 10' swd
(24,500 cu ft or 153,000 gal)
Retention: 2.5 hours
Loading: Surface, 612 gal/ft²/day
Weir, 5,360 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Mechanical aeration; single-pass
Size: Two 112' x 28' x 13.25' (79,400
cu ft or 0.495 mil gal)
Retention: 7.9 hours

Aerators

- Eight Ames-Crosta

Secondary Sedimentation

Type: Dorr Type AZ
Size: Two 40' x 40' x 10' swd (32,000
cu ft or 200,000 gal)
Retention: 3.2 hours
Loading: Surface, 470 gal/ft²/day
Weir, 4,700 gal/ft/day

CHLORINATION

- One W & T 200 lb/day

Chlorine Contact Chamber

Size: One 45' x 15' x 6' deep (27,000 gal)
Retention: 26 min

OUTFALL

- to Silver Creek

SLUDGE HANDLING

Digestion System

Type: Two-stage

Primary --

Type: Dorr draft tube mixers (3) on
fixed steel roof
Size: One 66' dia x 22.6' (avg) (77,800
cu ft or 485,000 gal)
Loading: 1.1 lb/cu ft/mo

Secondary --

Size: One 34' x 34' x 16.25' (20,700 cu
ft or 129,000 gal)
Total Loading: 0.87 lb/cu ft/mo

'71 Review

GENERAL

The Georgetown sewage project consists of a 1.5 mgd secondary water pollution control plant utilizing the activated sludge process. Sludge is digested anaerobically and hauled by tank truck to land disposal. The plant is located in a valley approximately one quarter of a mile from the nearest residential area, and on the southeast outskirts of Georgetown. Plant effluent is discharged to Silver Creek, then to the Credit River and eventually into Lake Ontario.

The sewage collection system consists of sewers and three pumping stations. One of these stations is financed and operated by OWRC and the other stations are Town owned and operated. Town forces maintain the sewer system. The cost of operating the OWRC pumping station is included as part of the project operating costs shown in the body of this report.

Industrial waste problems particularly high pH and high flows, occurred frequently and resulted in a deterioration of plant efficiency in comparison to previous years.

The primary digester was placed back into service but all gas had to be wasted due to deterioration of seals on the roof perimeter and at the connection to the secondary digesters. A consulting firm was engaged to investigate the sealing problem. Repairs will be carried out during 1972.

EXPENDITURES

In 1971, a total of 552.4 million gallons was treated at an operating cost of \$55,811.89. The unit cost of operation was \$101.4 per million gallons of sewage or 12 cents per pound of BOD removed.

PLANT FLOWS and CHLORINATION

Daily flows averaged 1.5 million gallons, down from 1.6 in 1970, and exceeded the design flow 55 percent of the time during the year. The flows decreased by 8 percent over 1970.

A total of 18,800 pounds of chlorine was required to maintain an average chlorine residual of 0.5 mg/l in the final effluent.

PLANT EFFICIENCY

The average raw sewage BOD was 112 mg/l which was 56 percent of design and slightly lower than in 1970. The effluent BOD averaged 23 mg/l exceeding the OWRC effluent BOD objective of 15 mg/l 80 percent of the time. The average BOD removal efficiency was 79 percent. This efficiency is quite low for secondary plants and is attributed to high flows and industrial waste discharges.

The average raw sewage suspended solids concentration of 233 mg/l was 16 percent greater than design and slightly lower than in 1970. The average suspended solids in the effluent was 25 mg/l. The OWRC effluent suspended solids objective of 15 mg/l was exceeded 60 percent of the time.

SLUDGE DIGESTION and DISPOSAL

Difficulties in disposing of sludge continued until the digester was producing well digested sludge late in the year, as a result of careful monitoring of the disposal operation by local public health and provincial regulatory authorities.

Repairs to the digester to eliminate gas leaks were effective temporarily but leaks appeared soon after gas production commenced. The consulting firm of Metier Limited was retained to investigate the sealing problems and their report was still pending at the end of the year.

A total of 8,663 cubic yards of sludge was hauled during the year.

CONCLUSIONS

Plant flows, BOD and suspended solids loadings dropped slightly during 1971 from the previous year. However, the plant is still operating at above design conditions much of the time.

Industrial waste problems particularly high pH, frequently upset the biological treatment process and reduced overall efficiency. Continuing efforts by Town forces to trace the sources of this waste have helped to eliminate upsets, but flows of considerably varying pH continue to enter the plant.

Expansion of plant capacity or major reduction of infiltration is urgently required. Efforts to eliminate major pH variation in the raw sewage must be continued. Unless and until these are accomplished, improvements in effluent quality cannot be anticipated.

PROJECT COSTS

| | |
|---|----------------------|
| NET CAPITAL COST (Final) | \$871, 677.01 |
| DEDUCT - Portion financed by CMHC/MDLB (Final) | <u>48, 379.33</u> |
| Long Term Debt to OWRC | <u>\$823, 297.68</u> |
| Debt Retirement Balance at Credit (Sinking Fund) December 31, 1971 | <u>\$242, 517.68</u> |
| Net Operating | \$ 55, 811.89 |
| Debt Retirement | 5, 795.00 |
| Reserve | 4, 007.10 |
| Interest Charged | <u>46, 179.45</u> |
| TOTAL | <u>\$111, 793.44</u> |

RESERVE ACCOUNT

| | |
|-----------------------------|----------------------|
| Balance @ January 1, 1971 | \$ 49, 953.73 |
| Deposited by Municipality | 4, 007.10 |
| Interest Earned | <u>3, 325.74</u> |
| | \$ 57, 286.57 |
| Less Expenditures | <u>2, 548.65</u> |
| Balance @ December 31, 1971 | <u>\$ 54, 737.92</u> |

1971 COSTS

OPERATING COSTS

| | |
|-------------------------|-------|
| ● PAYROLL | 51 % |
| ● FUEL | 4 % |
| ● POWER | 12 % |
| ● CHEMICALS | 6 % |
| ● GENERAL SUPPLIES | 3 % |
| ● EQUIPMENT | 1 % |
| ● REPAIRS & MAINTENANCE | 4 % |
| ● SUNDRY | 18 % |
| ● WATER | NIL % |
| ● TRAVEL | 1 % |

TOTAL ANNUAL COST

| | |
|-----------------|------|
| NET OPERATING | 50 % |
| DEBT RETIREMENT | 5 % |
| RESERVE | 4 % |
| INTEREST | 41 % |

YEARLY OPERATING COSTS

| YEAR | SEWAGE TREATED in million gallons | TOTAL OPERATING COSTS | TREATMENT COSTS | |
|------|--------------------------------------|--------------------------|--------------------|--------------|
| | | | \$ per million gal | £ per lb BOD |
| 1967 | 650.11 | \$42,383.25 | \$ 65.19 | 9 cents |
| 1968 | 539.42 | 43,308.19 | 80.29 | 11 cents |
| 1969 | 477.8 | 48,582.44 | 101.68 | 16 cents |
| 1970 | 596.7 | 49,195.43 | 82.45 | 9 cents |
| 1971 | 552.4 | 55,811.89 | 101.00 | 12 cents |

MONTHLY OPERATING COSTS

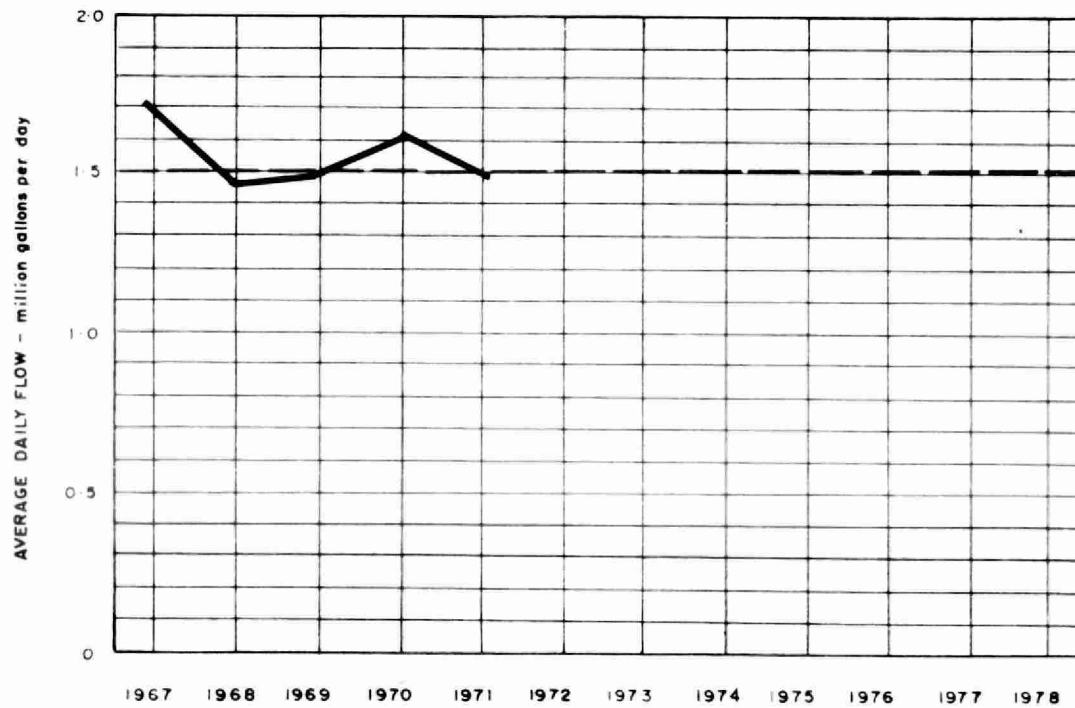
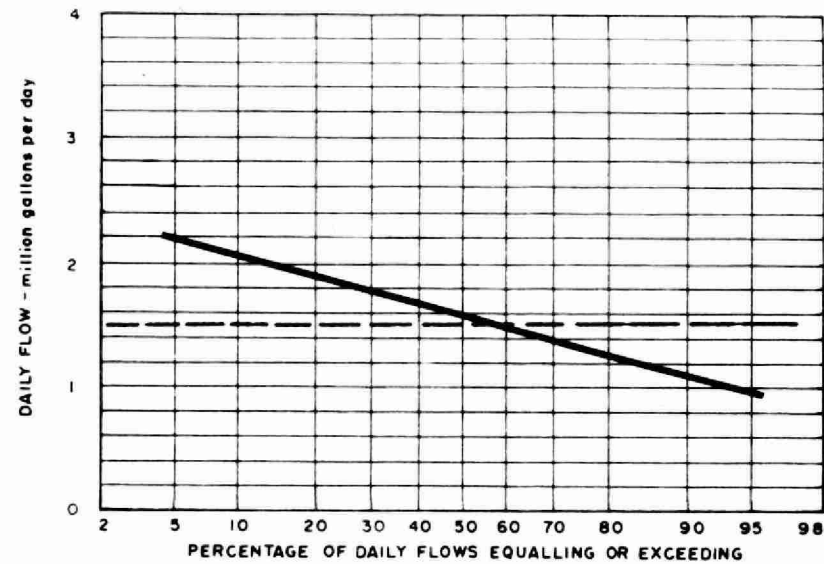
| MONTH | TOTAL EXPENDITURE | REGULAR PAYROLL | CASUAL PAYROLL | FUEL | POWER | CHEMICALS | GENERAL SUPPLIES | EQUIPMENT | REPAIRS and MAINTENANCE | SUNDRY* | WATER | TRAVEL |
|-------|----------------------|--------------------|-------------------|---------|---------|-----------|---------------------|-----------|----------------------------|----------|-------|--------|
| JAN | 2365.65 | 1856.50 | - | - | - | 290.59 | 93.87 | - | 57.19 | - | - | 67.50 |
| FEB | 5557.39 | 2756.59 | - | 294.42 | 621.29 | 290.59 | 21.14 | 73.45 | 64.00 | 1311.71 | - | 124.20 |
| MAR | 4016.99 | 1856.72 | 119.20 | 151.69 | 640.24 | 290.59 | 135.39 | - | 35.96 | 781.65 | - | 5.55 |
| APR | 3740.20 | 1898.69 | - | 146.32 | 566.76 | - | 221.07 | 96.84 | 33.31 | 667.71 | - | 109.50 |
| MAY | 3473.01 | 1856.71 | 280.35 | 160.78 | 568.97 | (221.75) | 103.48 | 376.54 | 223.90 | 100.03 | - | 24.00 |
| JUNE | 5084.30 | 2052.78 | (41.58) | 175.30 | 599.24 | 603.99 | 119.71 | 53.98 | 1158.40 | 285.23 | - | 77.25 |
| JULY | 2967.44 | 1926.40 | 288.72 | 111.85 | 545.02 | - | 122.57 | - | (231.80) | 86.78 | - | 117.90 |
| AUG | 5467.34 | 1923.88 | 352.02 | - | 520.34 | 278.25 | 101.87 | - | 256.71 | 2017.17 | - | 17.10 |
| SEPT | 6145.23 | 1831.69 | 352.02 | 267.36 | 1049.62 | 556.50 | 62.42 | - | 81.12 | 1862.00 | - | 82.50 |
| OCT | 3755.41 | 2845.62 | 230.62 | - | 40.87 | 278.25 | 83.12 | - | 202.23 | 24.45 | - | 50.25 |
| NOV | 5759.03 | 2856.59 | - | 238.95 | 542.10 | (124.54) | 32.67 | - | 72.26 | 2115.50 | - | 25.50 |
| DEC | 7479.90 | 3120.18 | - | 611.68 | 1140.46 | 858.15 | 538.29 | - | 162.85 | 878.34 | - | 169.95 |
| TOTAL | 55811.89 | 26782.35 | 1581.35 | 2158.35 | 6834.91 | 3100.62 | 1635.60 | 600.81 | 2116.13 | 10130.57 | - | 871.20 |

Brackets indicate credit.

* Sundry includes sludge haulage costs of \$7,048.60

PROCESS DATA

FLOWS

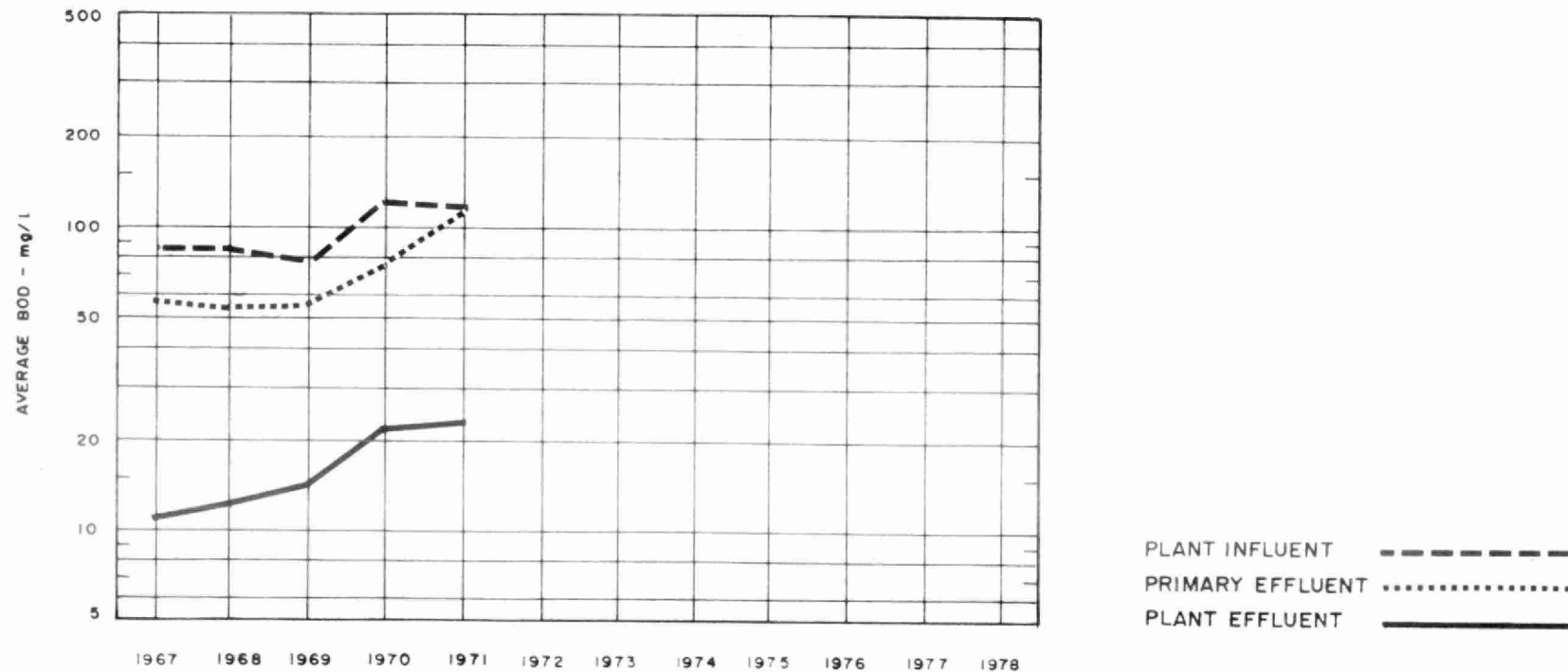
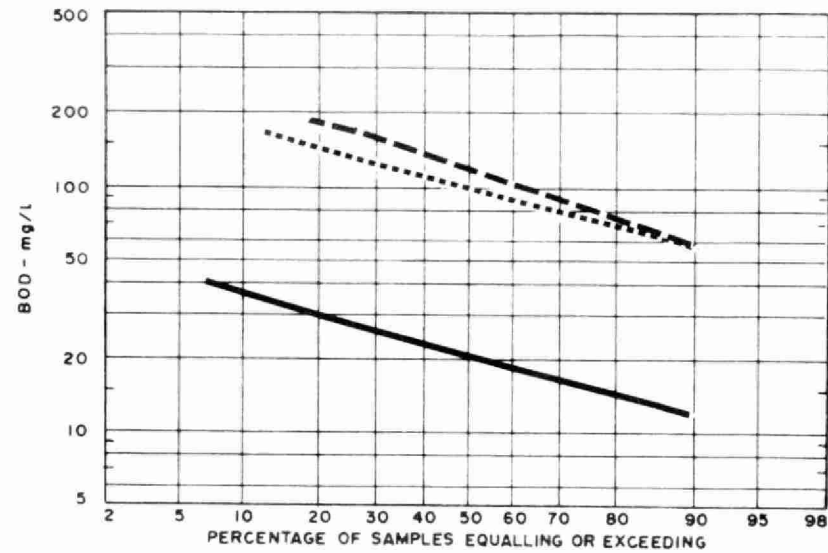


DESIGN CAPACITY — — — — —

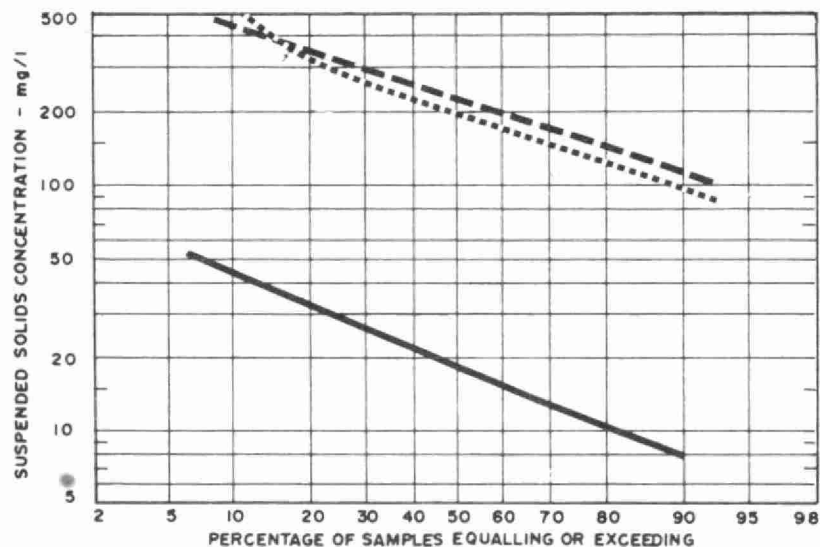
PLANT PERFORMANCE

| MONTH | FLOWS | | | | BIOCHEMICAL OXYGEN DEMAND | | | | SUSPENDED SOLIDS | | | | TOTAL PHOSPHORUS | | |
|----------------|-----------------|-------------|----------------|----------------|---------------------------|----------|-----------|------------------------|------------------|----------|-----------|------------------------|------------------|-----------|-----------|
| | TOTAL FLOW | AVERAGE DAY | MAXIMUM DAY | MAXIMUM RATE | INFLUENT | EFFLUENT | REDUCTION | | INFLUENT | EFFLUENT | REDUCTION | | INFLUENT | EFFLUENT | REDUCTION |
| | million gallons | mil gal | mil gal | mgd | mg/l | mg/l | % | 10 ³ pounds | mg/l | mg/l | % | 10 ³ pounds | mg/l as P | mg/l as P | % |
| JAN | 45.2 | 1.5 | 2.0 | 4.0 | 112 | 12 | 89 | 45. | 210 | 24 | 89 | 84. | 8.4 | 5.8 | 31 |
| FEB | 48.0 | 1.7 | 2.8 | 4.5 | 115 | 14 | 88 | 48. | 284 | 16 | 94 | 129. | 8.3 | 4.2 | 49 |
| MAR | 64.0 | 2.0 | 2.1 | 4.5 | 95 | 13 | 86 | 52. | 183 | 17 | 91 | 106. | 9.5 | 3.1 | 67 |
| APR | 58.3 | 1.9 | 3.2 | 3.7 | 90 | 17 | 81 | 43. | 152 | 63 | 59 | 51. | 6.6 | 4.8 | 27 |
| MAY | 49.9 | 1.6 | 2.1 | 3.4 | 120 | 16 | 87 | 52. | 285 | 26 | 76 | 109. | 11.0 | 6.0 | 45 |
| JUNE | 48.3 | 1.6 | 2.2 | 3.7 | 73 | 27 | 63 | 22. | 176 | 25 | 86 | 73. | 6.9 | 4.9 | 29 |
| JULY | 47.4 | 1.5 | 2.3 | 3.6 | 110 | 20 | 82 | 43. | 202 | 13 | 94 | 90. | 9.0 | 3.4 | 62 |
| AUG | 39.0 | 1.2 | 1.7 | 3.3 | 100 | 40 | 60 | 23. | 206 | 10 | 95 | 76. | 7.7 | 4.4 | 43 |
| SEPT | 37.9 | 1.3 | 1.6 | 2.7 | 115 | 27 | 77 | 33. | 323 | 10 | 97 | 119. | 10.5 | 5.5 | 48 |
| OCT | 36.2 | 1.2 | 1.4 | 2.7 | 140 | 24 | 83 | 42. | 258 | 34 | 87 | 81. | 11.5 | 6.2 | 46 |
| NOV | 35.9 | 1.2 | 1.4 | 3.4 | 133 | 25 | 81 | 39. | 317 | 19 | 94 | 107. | 11.0 | 6.1 | 46 |
| DEC | 42.3 | 1.4 | 2.4 | 2.7 | 110 | 34 | 69 | 32. | 254 | 12 | 95 | 102. | 8.4 | 5.0 | 40 |
| TOTAL | 552.4 | - | - | - | - | - | - | 474. | - | - | - | 1127. | - | - | - |
| AVG. | - | 1.5 | MAXIMUM 3.2 | MAXIMUM 4.5 | 112 | 23 | 79 | 40 | 233 | 25 | 89 | 93. | 9.2 | 5.2 | 43 |
| No. of Samples | - | - | - | - | 19 | 20 | - | - | 82 | 66 | - | - | 20 | 20 | - |

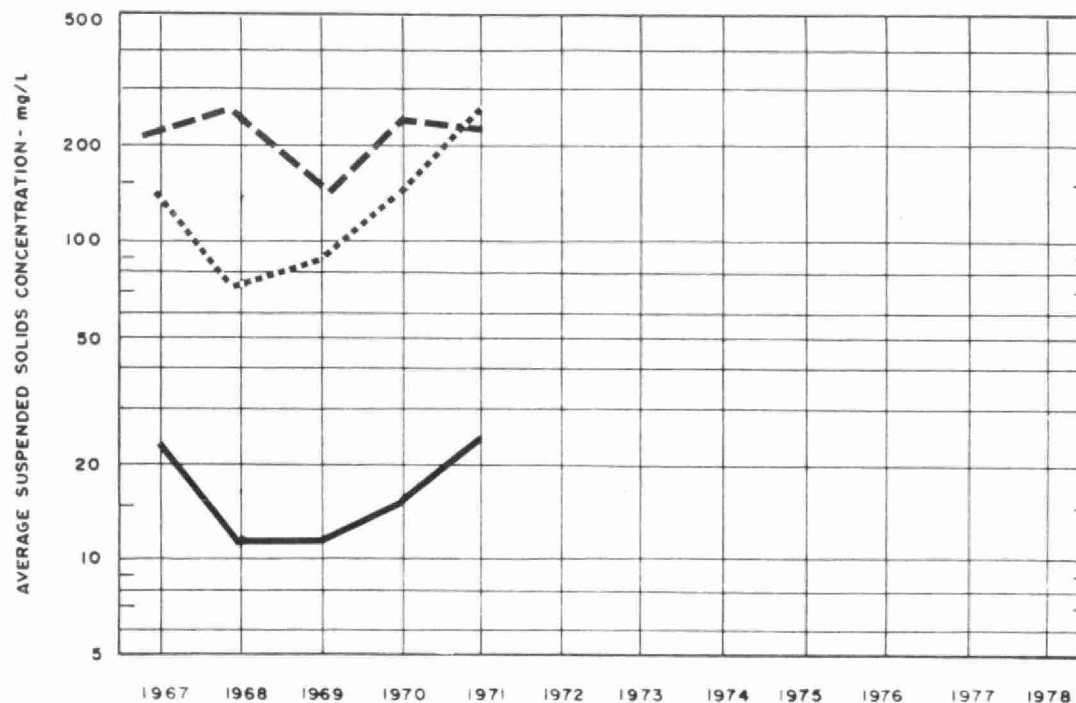
BIOCHEMICAL OXYGEN DEMAND



SUSPENDED SOLIDS



PLANT INFLUENT - - - - -
 PRIMARY EFFLUENT
 PLANT EFFLUENT _____



TREATMENT DATA

| MONTH | GRIT | CHLORINATION | | PRIMARY EFFLUENT | | AERATION | | | SLUDGE DIGESTION and DISPOSAL | | | | | | | |
|-------|-----------------------------------|---|----------------------|------------------|-----------------------------|----------------------|--------------------------|---------------------------------------|--|----------------------|---------------------|---------------------------|----------------------|---------------------|--------------------------------|---------------------------------|
| | QUANTITY REMOVED cubic feet | CL ₂ USED 10 ³ pounds | AVG. DOSE mg/l | BOD mg/l | SUSPENDED SOLIDS mg/l | MLSS CONC mg/l | F/M day ⁻¹ | AIR 1000 ft ³ lb BOD | RAW SLUDGE | | | DIGESTED SLUDGE | | | SUPER- NATANT T. S. % | AMOUNT HAULED cubic yards |
| | | | | | | | | | QUANTITY 10 ³ gallons | TOTAL SOLIDS % | VOL. SOLIDS % | QUANTITY 10 gallons | TOTAL SOLIDS % | VOL. SOLIDS % | | |
| JAN | 32 | 1.24 | 2.7 | 160 | 664 | 2080 | .22 | - | 73 | 8.0 | 64 | - | - | - | - | 632 |
| FEB | 43 | 1.12 | 2.4 | 265 | 438 | 2760 | .32 | - | 63 | 9.4 | 57 | - | - | - | - | 198 |
| MAR | 108 | 1.50 | 2.0 | - | 285 | 3490 | - | - | 274 | 8.9 | 59 | - | - | - | - | 1824 |
| APR | 24 | 1.62 | 2.8 | 90 | 130 | 2470 | .13 | - | 81 | 12.9 | 60 | - | - | - | - | 0 |
| MAY | 28 | 1.54 | 3.1 | 100 | 351 | 2720 | .11 | - | 4 | 7.7 | 60 | - | - | - | - | 21 |
| JUNE | 43 | 1.51 | 3.1 | 87 | 132 | 2190 | .12 | - | 240 | 7.2 | 57 | - | - | - | - | 1309 |
| JULY | 20 | 2.23 | 4.7 | 100 | 156 | 1600 | .18 | - | 100 | 7.0 | 57 | - | - | - | - | 160 |
| AUG | 29 | 1.48 | 3.8 | 85 | 185 | 1560 | .13 | - | 381 | 6.0 | 57 | - | - | - | - | 726 |
| SEPT | 22 | 1.51 | 4.0 | 70 | 186 | 1340 | .13 | - | 250 | 5.4 | 59 | - | - | - | - | 1757 |
| OCT | 33 | 1.58 | 4.3 | 80 | 150 | 2240 | .08 | - | 259 | 5.3 | 57 | - | - | - | - | 1189 |
| NOV | 28 | 1.65 | 4.6 | 98 | 167 | 3680 | .06 | - | 188 | 6.8 | 61 | - | - | - | - | 580 |
| DEC | 49 | 1.90 | 4.5 | 85 | 216 | 3020 | .07 | - | 170 | 7.5 | 60 | - | - | - | - | 267 |
| TOTAL | 459 | 18.80 | - | - | - | - | - | - | 2083 | - | - | - | - | - | - | 8663 |
| AVG. | .8 cu. ft/mil gal | 1.57 | 3.4 | 111 | 255 | 2430 | .13 | - | 174 | 7.6 | 59 | - | - | - | - | 722 |

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